

SLAPR PROTOCOL  
VOLUME 2, NUMBER 4  
JULY/AUGUST, 1983

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VOLUME 1, NUMBER 1  
JULY, 1982

It's A ~~BOY~~ PACKET Club



Name St. Louis Area Packet Radio

Born 6/30/1982

Weight 34 MEMBERS

Parents Pete - WB9FLW

Bill - WD8ETZ



SLAPR PROTOCOL  
NEWSLETTER OF THE  
ST. LOUIS AREA PACKET RADIO CLUB

	CONTROL	
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identifies the purpose of the packet

#### WHERE IS THE ST LOUIS ACTION

I really feel sorry for Tom, WAOKGU, and Spence, KAOIXI. I am sure that they have a complex. They may even think they have BO, the way they are being avoided on the air. I have been on almost every evening that I am in town and Tom and Spence are beaconing away like mad trying to drum up a little activity. Keep up the action Tom and Spence! That is the only way that we are going to get anything going at all. The other night I wanted to test a new antenna for the link into St. Louis. There were only two possibilities. You got it! Tom and Spence!

#### RESPONSIBILITY

Remember when everybody in Timbucktoo wanted one of those boards? Well, we in St Louis had an inside track and were privileged to get early delivery and a greater number than most areas. Sure, we worked harder to get to that point. But what has happened since then. In some areas those boards have been tied to all kinds of computers and people have access to all sorts of things on a shared basis. In some areas those boards have been used to communicate between ZL1AOX and WA2LQQ and others. Friends, that is SSB on 28.300MHz at 400 and 600 Baud. OSCAR 10 is flying, although not as planned. What are the chances that St. Louis will be the first to make it successfully through the bird with PACKET? We were privileged in the beginning. How are we responding to show our appreciation and responsibility?

#### NOW IT IS UP TO YOU

That is right. YOU are the missing link. Nothing is going to get done if YOU don't do it.

## LOCAL LEADERSHIP

Now what we need is a little local leadership. I am sure that there are others like myself who would be glad to lend a hand at most anything that is within our capabilities. Where is that one person to put things together and help the rest of us get organized? You don't have to do it all by yourself. We are willing to help. But nothing is going to get done if someone doesn't take the bull by the horns and give a little direction to the experimentation that we should be about at this time in the process. Who is working on organizing some action for OSCAR 10 and later PACSAT? Who has contacts at some of the local community colleges, universities and other such places for access to some real live computer capability? Do you really know what the link conditions are between here and there for use of PACKET in an emergency? Or would you go back to the "talk box" to get your message through? Are these things really of any value in an emergency situation? How do you know? Did you read about it? You certainly didn't see it in action in St. Louis. I am told that I should be able to have this newsletter on PACKET by now. But I am no computer guru. I know a little about radio and have a variety of reasons for being interested in PACKET. What good would it do to have SLAPR PROTOCOL available on 555? (What is 555. you ask? Glad you did. That stands for 147.555 MHz, the PACKET radio frequency in the St. Louis area and where we would like to see more of the readers of this humble newsletter.)

## YOU HAVE LEADERSHIP CAPABILITIES

Come on friends. There must be an area in which you would like to have a little help to get things going. What is your area? What help do you need? Give us a lead. We'll follow. What about me? I'm working on a BBS. Anyone interested? I need help making the APPLE do it.

disconnect W90FZ



# THE AMERICAN RADIO RELAY LEAGUE, INC.

HEADQUARTERS LOCATED AT 225 MAIN STREET, NEWINGTON, CONNECTICUT 06111

ADMINISTRATIVE HEADQUARTERS: NEWINGTON, CONNECTICUT, U.S.A. 06111

Paul Grauer, WØFIR  
Director, Mid West Division, ARRL  
Box 100, Wilson, KS 67100

Bill Reed, WDOETZ  
3110 Afton Drive  
Carrollton, TX 75007

Dear Bill:

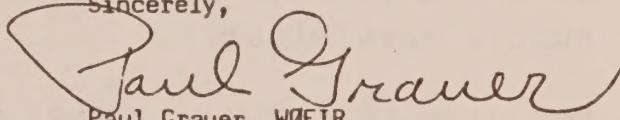
I was very sorry to hear that you had moved from St. Louis to Dallas. Your departure has left a big hole that will be most difficult to fill.

I wish to express my appreciation for the contributions you have made in the development of packet radio technology and in explaining and demonstrating this important new amateur radio communications mode throughout the midwest area. I know that you have been a mainstay of the St. Louis Area Packet Radio group and the largest Beta Test Site for the TAPR TNCs. Your work has been a very real credit to SLAPR, the Missouri Section, and the Midwest Division.

It is our hope that you will continue your pioneering efforts in Dallas, and continue to spread the word on packet radio and its advantages for error-free high-speed data communications and frequency-sharing. In years to come, packet radio will be a very important tool for better utilization of our amateur frequencies, and your work can contribute significantly to the realization of its potential. I know that there are many innovative and forward-looking amateurs in Dallas and North Texas that will welcome your assistance and guidance, and anything you can do to bring that area into the packet radio network.

I wish you well in your new assignment. It is always an upheaval to move into a new area and get your family settled in with new neighbors, etc... However, I am sure that you will find Dallas to be a most interesting city and one that will offer many advantages to yourself and your family. We will miss you, and we appreciate all that you have done.

Sincerely,

  
Paul Grauer, WØFIR  
Director, Midwest Division

PG:st

cc: Ray Wangler

SINCE 1914 - OF, BY AND FOR THE RADIO AMATEUR

VICTOR C. CLARK  
WØVLC, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
DANIEL C. COOPER  
WØDC, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
LARRY E. PRICE  
WØLPC, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
GARFIELD A. ANDERSON  
WØGAA, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
RICHARD L. BALDWIN  
WØRLB, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
JAMES E. McCUBB  
WØJEM, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
DAVID SUMNER  
WØZED, 2110 1/2 S. 100 E.  
LAUREL, MONTANA  
203 666 1541

**QST**  
OFFICIAL JOURNAL

# LINK...ING

WA7GXD

Proposed Packet Radio High Speed Linking

Amateur packet radio is currently being established as a viable mode of communications. Nearly 200 Tucson Amateur Packet Radio (TAPR) Terminal Node Controllers (TNCs) are in the field with the promise of more to come soon. It is believed that on the order of 100 Vancouver TNCs are also in the hands of active packeteers.

The present situation, then, has about 300 stations in about 30 locations communicating (primarily) on short-range VHF frequencies at a signalling rate of 1200 bits per second (bps). Clearly, it would be desireable to establish inter-group packet communications. Further, the availability of non-local coverage would enhance the viability and probable acceptance of packet radio as a primary Amateur communications technique.

Recently, some notable experiments have been conducted between the east and west coasts of the United States, as well as between the US and New Zealand. A channel has been allocated to digital experimentation on the Phase 3B satellite. A packet radio satellite has been proposed and is currently being designed by AMSAT. All of these systems are aimed at expanding the geographical coverage of packet radio stations.

One problem with all of these methods is that the achievable signalling rate is relatively slow. The Phase 3B satellite channel is both bandwidth and power limited, making a 1200 bps signalling rate about the best we can hope for. HF links are also limited by regulation and ionospheric propagation to a maximum of 1200 baud and typically 100 to 300 baud. PACSAT is primarily a non-real-time system, with a maximum data rate of perhaps 9600 baud.

One of the touted advantages of packet communications is the concept of resource sharing. Conceptually, the simplest of packet stations within range of a sophisticated gateway station should be able to use the resources of the gateway to extend its own coverage, somewhat akin to the user of a handheld VHF rig using a mountaintop repeater, or an autopatch, to extend his coverage.

While AMSAT is concentrating its resources in the development of satellite techniques, and AMRAD is working on an adaptive modem design for hf use, TAPR has committed itself to the development of high-speed UHF/microwave linking equipment. This concept is not new, but it is new within the Amateur radio environment, and that same environment places unique constraints on the equipment itself. The remainder of this paper will address the system requirements followed by suggested approaches to implementation.

de WA7GXD

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### TOPOLOGY

The current packet centers of operation are widely scattered geographically, and widely separated from one another in terms of VHF coverage. The patterns that seem to emerge are generally consistent with population density. It may be that, as packet radio takes hold, its station distribution will more closely align with the general population distribution.

Present centers of activity include San Francisco, Los Angeles, San Diego, Phoenix, Tucson, Colorado Springs, St. Louis, Little Rock, Chicago, Minneapolis, Racine, Ann Arbor, Indianapolis, Dayton, Washington DC, New Jersey, Connecticut, eastern Massachusetts and Florida. In addition, there is activity in Vancouver, Hamilton, upstate New York and expected activity in Dallas, Atlanta and North Carolina.

It can be seen that some sites could conceivably link using UHF frequencies with little trouble, such as LA/San Diego and Phoenix/Tucson. Other groups could link via one or two additional hops, such as LA/San Francisco, San Diego/Tucson, St. Louis/Little Rock, St. Louis/Chicago, Chicago/Racine, Chicago/Ann Arbor, etc. As more activity develops, more sites could, and presumably would, link into this web.

Again looking at the above examples, it is clear that some centers tend to form a hub, such as Chicago, St. Louis and San Diego. Fortunately, these sites include some of the most active and enthusiastic packet groups.

### SYSTEM OBJECTIVES

In order to link these existing sites, and allow for anticipated growth, some estimate of traffic offered the system must be made, and acceptable traffic delays estimated. The excess capacity needed for throughput delay can then be factored in and a goal defined.

If we assume that (1) packet activity is going to explode in the next five to ten years (from, say, 300 users now to 3000 in five years and 15000 in ten), (2) that the increasing presence of computers in the ham shack is a trend and not a fad and (3) traffic nets will take advantage of fast, reliable means of communications when available, then the traffic offered the system will likely be enormous in a few years time.

On the average, an active packeteer may be expected to operate a few nights a week, and will likely be accessing local bulletin boards and other local activities. He may attempt conversation with other stations in the larger network, or participate in multiparty nets a couple of nights a week. If he is on an hour a night, he may generate a few thousand characters of data. While all of this is

de WA7GXD

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Somewhat nebulous, if used as a rough guide, our typical packeteer may offer the larger network upwards of 10,000 bytes/hour in bursts, but only about 400 bytes/hour average on active days, or about 100 bytes/hour on long term average. This is well under 1 baud.

At the present packet population, this means the network may be offered a peak burst rate of 3,000,000 bytes/hour (about 50,000 bytes/min or about 6600 baud). In five years this can be expected to increase by an order of magnitude to about 66 kilobaud and in ten years to around 330 kilobaud. Naturally, this assumes that everyone is on at once and wants to use the network at the same time -- not likely, but a yardstick.

If we assume that the more sophisticated Amateurs will take advantage of packet radio's data integrity to ship lengthy files, as opposed to RTTY-like chit-chat, the system loading will increase even more dramatically. If every packeteer were to try to back up his winchester disk, the system could experience severe constipation almost immediately!

In order to reduce system delays, it is common to design in excess capacity so that the system is lightly loaded. From the above, assuming the users not on the system are compensated for by the file-dumpers, it would appear that a capacity to handle upwards of 50 kbaud is desireable for the "trunks" to meet the five-year demand, and this is to be taken as a minimum. 250 kbaud would be better.

A final assumption is that, as activity picks up, parallel trunks may be established, such as VHF FM repeaters often have similar coverage to reduce the loading on any specific machine.

#### HARDWARE REQUIREMENTS

Based on the above topological and loading considerations, the following specifications are offered as a guide in implementing a high speed Amateur packet radio linking system.

Each relay link will operate on 220 MHz or above. The FCC allows us a 100 kHz data bandwidth on this band. Above 1215 MHz, bandwidth does not become a practical limitation. If a 50 kbaud link is to be built, 220 MHz is recommended for the following reasons:

- 1) Rf gear is easily built for this frequency.
- 2) Rf gear is cheap at these frequencies.
- 3) Rf gear for these frequencies can be easily maintained.
- 4) The 100 kHz bandwidth limitation will easily accomodate 50 kbaud. Use of fairly sophisticated modulation techniques could realistically extend this data rate to around 200 kbps.

de WA7GID

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If significantly higher data rates are otherwise practical, L-band (1215 MHz) is suggested due to less crowding than 440 MHz and no practical bandwidth limitations. Equipment for this band is not cheap, however, and the rf circuitry is not as easily maintained (perhaps due to lack of familiarity with microwave techniques by most Amateurs).

Topology suggests that the high speed equipment be multiport to efficiently handle an n-way branch. Further, an input port is needed for the local area to have access. Provision for up to four high speed channels is suggested.

In the interests of (1) spreading the design task around and (2) flexibility a modular design is proposed. The modules are as follows:

1) Rf deck. This is to be a single-channel, crystal-controlled unit of about 10-watts power output, class C, well protected from antenna faults and the like. The transmitter will accept an if signal at 10.7 MHz. The receiver will be controlled by the same oscillator and have an output of 10.7 MHz.

2) If deck. This is to contain the modem. It will accept the necessary logic signals and convert them to a modulated signal at 10.7 MHz. Similarly, the incoming if signal at 10.7 MHz will be decoded to the proper logic level output(s).

3) Digital deck. This unit will contain the microprocessor, memory and logic-level I/O ports. Due to the speeds involved, a fast 16-bit processor is suggested. Possible candidates include the 68000 or perhaps the 8086. Software development tools are a real consideration here. The memory should be large enough to buffer the incoming channel(s) traffic. If half-duplex operation is required, then it must store up to 4 channels' worth at the maximum data rate until channel turnaround. It may be that the controlling software will be RAM-resident with some sort of bootstrap circuit. It is proposed that the RAM be on the order of 1/4 megabyte, error-detecting, and sufficient bytewide sockets be provided for up to 64 k bytes of EPROM. If full duplex operation is instead used, the buffering requirements may be lessened and system RAM on the order of 64k to 128 k bytes may be acceptable.

In addition, the equipment must be easily duplicable, maintainable and cost effective. It is anticipated that local groups will support their machine in much the same fashion as repeater groups support repeaters. This equipment doesn't have to be designed to be financed and supported by a single individual, and a total cost ceiling may be on the order of \$1500 to \$2000. To this must be added the costs of power, access, antennas, site fees and so forth.

de WA7GXD

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## SOFTWARE CONSIDERATIONS

Higher level protocols have not yet been defined for Amateur packet radio. The first high-speed linking devices will of necessity be test-beds for protocol experimentation, and therefore must be very flexible. It is not inconceivable that software development tools may best reside on the digital unit itself, along with mass storage. Once things are defined and the network grows, the sophistication of the "linker" may be reduced by the removal of such features.

Alternatively, the linker may be tightly coupled to an accessible development system with upload/download capabilities for fast turnaround during the development cycle. It is not practical to assume that the linker itself will be easily accessible if it is to provide wide-range coverage.

Any language selected should be capable of (1) support and (2) efficient compilation. The linker may have to perform routing decisions and do so during peak traffic conditions, so slow or inefficient algorithms or compilers may not work.

## IMPLEMENTATION

It is suggested that this paper be kicked around, counter-proposals made, investigations into modulation techniques and hardware be undertaken, and in general discussion be entered by those with an interest. After some finite period, hopefully on the order of two or three months, TAPR should make some definite decisions and begin the design task.

By modular design, various hardware systems can be designed at various TAPR and TAPR-affiliated sites. Similarly, the software effort must be coordinated and tasks passed around to those with the ability to help. It is expected that TAPR will coordinate the efforts of the volunteer sites.

We have witnessed the birth of a new era in Amateur radio communications. It is up to us to assure its health and growth. "PACLINK" is needed. TAPR possesses the necessary skills and motivation to implement it. An opportunity to have a lasting impact on Amateur radio beckons, and we must once again rise to the challenge.

## THE CHARGE OF THE PHONE BRIGADE or Ma Bell strikes again

Got a modem?

Been enjoying HamNet, Tymnet, The Source and all the other wonderful things that you can get with digital communications by telephone?

Has Ma Bell gotten you for the extra \$50.00 for having that modem on your end of her line? No! LUCKY you are!

That's right folks. Ma Bell is in the process of adding a special charge for ANY modem that is attached to your phone line. Southwestern Bell is charging \$45.90 per month. Take note SLAPR members. It is Southwestern Bell that serves the St Louis area as well as Oklahoma. That is where Robert Braver, sysop for USEMC-BBS, learned all about the special modem charge.

In May Bob was informed that he would have to pay the information terminal rate. That meant that his phone bill would go by 500%. After arguing with Ma Bell he found out that it was perfectly legal and that there is a special charge for modem users. It is a flat fee and it makes no difference if you use the modem all day every day or if you use it once every six months. If it is attached to the line it is subject to the special tariff. What it comes down to is that Ma Bell is trying to price non-commercial modems off line.

These increases are being challenged at the FCC, but it appears that no one really knows what is all about. It seems to go something like this. There are two new fees. In the first place the long distance companies will have to pay a fee to the local phone companies for use of their local switching system. On the opposite side, there is a fee to be paid by the local subscriber for the services used. One portion would be a time-measured system for local calls like is presently used for long distance now. The whole idea is to

have the user pay for the services. This will place more of the cost of operating the local system on the shoulders of the local user. The problem seems to be that the FCC feels that the use of data transfer equipment places the modem user in the classification of the long-distance companies and not of a local user, a residential or business customer.

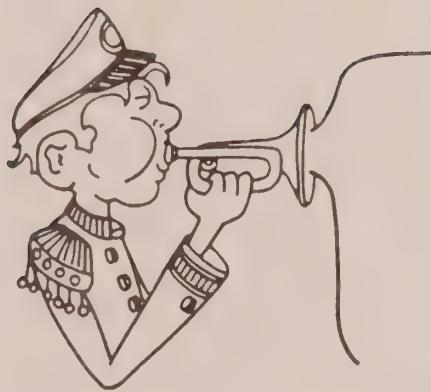
So what does it mean, other than the fact that my phone bill will go out of sight? It means that computer telecommunications systems like CompuServe will most likely be forced out of business. It is not that they will be forced to pay so much. It is that you and I will be priced right off the line and they will have no customers to keep them going.

Don't stir up a hornet's nest. My bill has not gone up yet. But a word to the wise may well be sold in the pocket.

Some of the folks are organizing to stop this communications robbery. One group is the Oklahoma Modem Users' Group (OMUG). They are getting themselves ready, even to the point of legal counsel. At present a petition is being prepared to request that telephone service be classified as either "business" or "residential" and that there be no reference to modem use. They argue that the use of a modem does not necessarily constitute a "business." They also argue that a modem makes the same use of the telephone line as voice transmissions and therefore should not be classified separately. If you have any further questions about OMUG or the problem in general, you might want to be in touch with Robert Braver. His voice line is 405-360-7462.

Thanks to SLAPR member, Scott Loftness (N3US) for tracking down all of this information that may seriously affect each of us shortly and for having it available on HamNet.

disconnect, K80FZ



# SVA PR 1<sup>ST</sup> BIRTHDAY PARTY

July 24

3:00 PM

35 NORSPUR  
GLEN CARBON

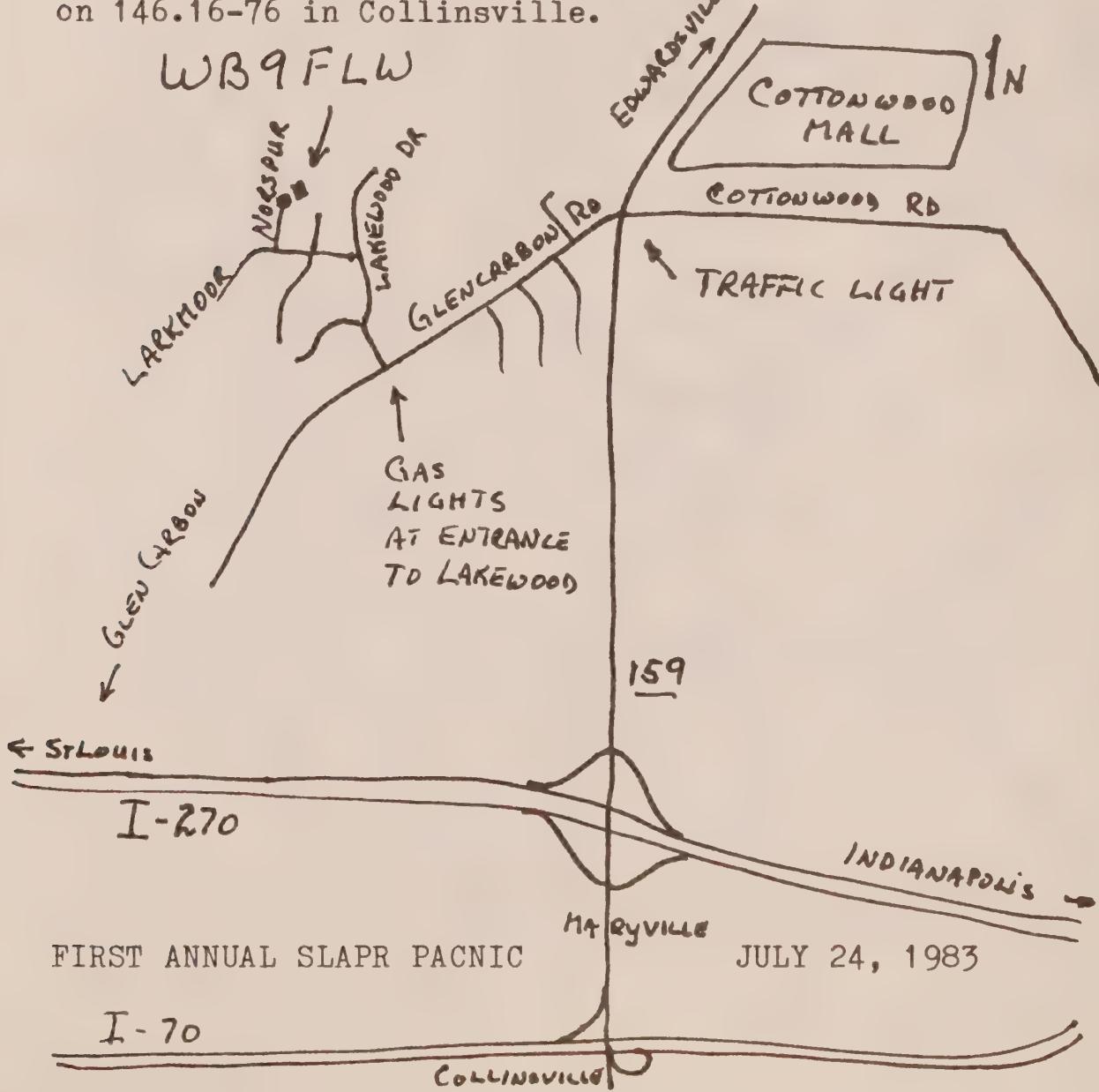


## SLAPR'S FIRST ANNUAL PACNIC

The QTH of WB9FLW will be the scene of the FIRST ANNUAL PACNIC. It is to be held in lieu of the regular July meeting. This will be a birthday celebration for SLAPR. SLAPR IS ONE YEAR OLD in July. Sunday, the 24th, will mark this anniversary. A birthday bash would be great. Lets all make it.

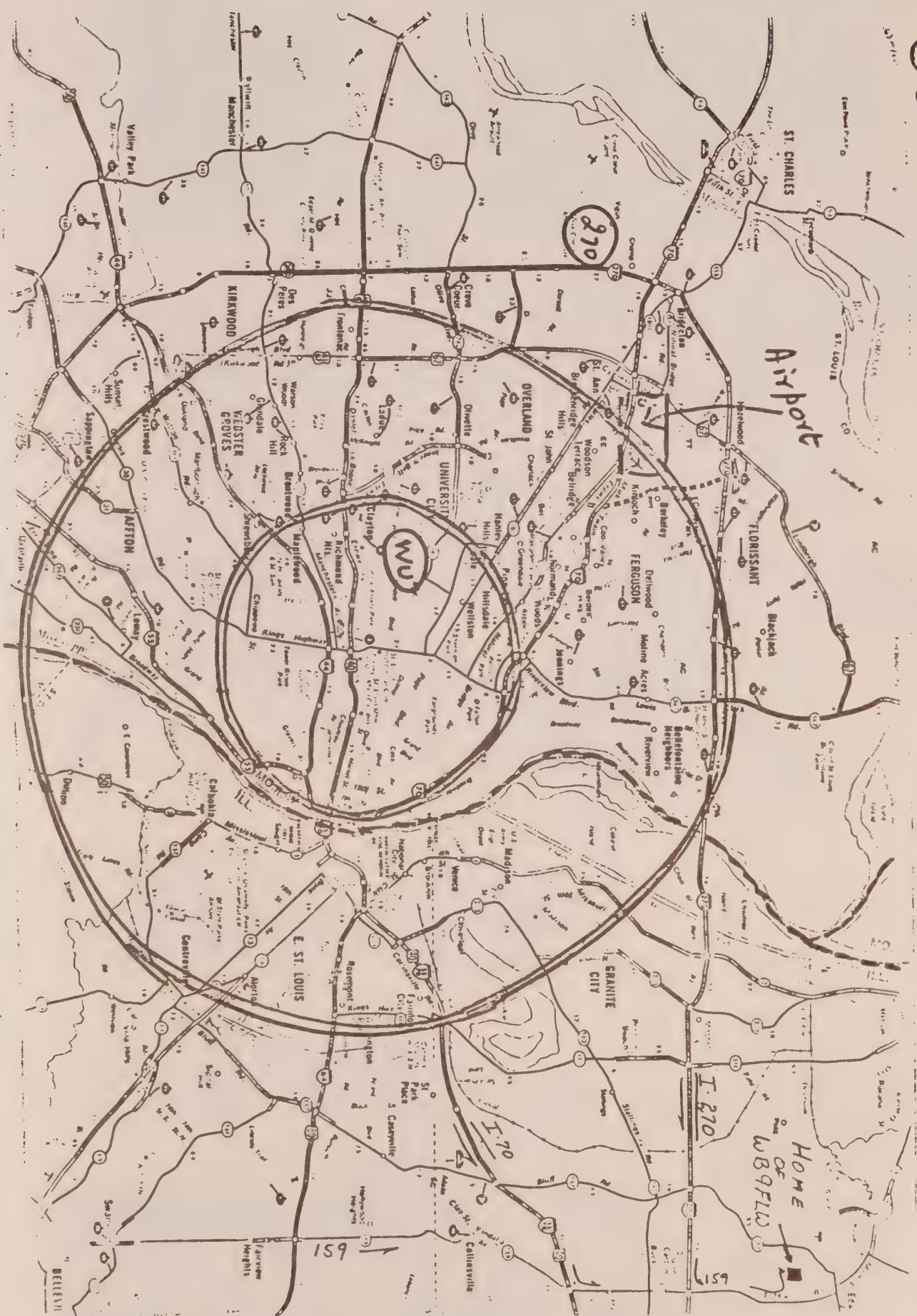
Grill space will be available for your hot dog or steaks. The coals will be hot from 3:00 PM on. Please also bring a dish to share with others. Cold drinks will be provided.

Just follow the map below. LOST? Get a talk-in on 146.16-76 in Collinsville.



# Come to the St. Louis Mecca of Packet Radio

- 14 -



17-1681M

## THE SOFTWARE APPROACH

Remember back a few issues we wrote of the announcement of a software approach to PACKET? Remember in the last issue we indicated that the program was about ready to go and that a book would be on the market in May from Richcraft Engineering Ltd. Well folks, IT IS HERE.

### SYNCHRONOUS PACKET RADIO USING SOFTWARE APPROACH by Robert M. Richardson

Pete, WB9FLW, received a copy the other day and loaned it to me to look at so that we could tell you all about it. Impressive, to say the least. Bob Richardson, W4UCH, has done a fine job of documenting his work in the area. This is a must if you are into PACKET and TRS-80's. It is a must if you are interested in PACKET from the software approach. Talk about complete! How complete, you ask. Well, let me show you.

Here's an abbreviated table of contents:

Interface to outside real-world	
IBM synchronous data link control	
Fundamental SDLC transmit modules	
Frame check sequence	
Fundamental SDLC receive modules	
Transmit program modules	
Edit & modify mode	
Packet program object code	50pp
Packet program source code	42pp
Edit/modify and Morse program object code	18pp
Edit/modify and Morse program source code	16pp

So, how do you get it? Write or call

RICHCRAFT ENGINEERING LTD.

1 Wahmeda Industrial Park

Chautauqua, New York 14722

COD orders only (716) 753-2654

disconnect w9ofz

	BETA BITS	
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from TAPR

## ANNOUNCEMENT

### TNC AVAILABILITY

Tucson Amateur Packet Radio Corporation has conducted extensive testing of a Terminal Node Controller (TNC) design over the last several months. 172 TAPR TNCs are in the field, and the "Beta" design has been in continuous testing since early November, 1982.

In order to more fully discharge our charter in developing and refining packet radio communications, TAPR is on the brink of releasing the TAPR TNC to the general Amateur community. The TNC will be provided as a kit that includes all parts; comprehensive manual including detailed kit assembly instructions; custom power transformer with multitap primary for those in low- or high-voltage areas; electrically pre-tested printed circuit board with silk screened parts locations; built-in modem, power supply, RS232 interface and radio interface.

### REFINED DESIGN

For those familiar with the Beta design, the following improvements have been implemented in the hardware design:

- 1) 32 k bytes of EPROM (vs Beta's 24 k).
- 2) 8k bytes of RAM (vs Beta's 6 k).
- 3) Two 512-bit banks of NOVRAM (vs Beta's single 256-bits).
- 4) Modem disconnect, with all applicable HDLC connections.
- 5) Improved modem design, with lower noise floor, greater input signal range, greater mic audio adjustment range, improved signal level indicator circuitry, LED monitoring of additional signal lines (such as Data Carrier Detect), configuration of modem parameters via DIP carrier.
- 6) Serial I/O port access is via a right angle pc mount DB25S connector at the edge of the board.
- 7) Parallel port access is via a right angle pc mount DB25P connector at the edge of the board.
- 8) Radio I/O port access is via a right angle pc mount DB9S connector at the

edge of the board.

9) Power connection is via an 8-pin "Molex" style power connector.

10) The +5 volt supply uses 3 amp diodes instead of the 1N4001s found on the Beta board.

11) The +5 volt supply has a jumper, along with additional power supply connector pins, to support an off-board 5 volt regulator.

12) The power transformer has been redesigned with 105/115/125 volt ac primary taps and corrected secondary windings.

13) The serial I/O port uses pullup resistors so no jumpers are needed to support partial RS232 interfaces (such as "three-wire" terminals).

14) Revised circuitry for calibrating the 1700 Hz PLL demodulator.

TAPR is currently generating the updated manual and the board layout is being revised. At the conclusion of board layout, a trial run of 25 kits will be supplied to a limited number of Beta sites for testing. This is anticipated in the late-July to mid-August time frame. We are limiting this initial release to a few boards per selected existing site to ensure a rapid turnaround in the testing. It is not our intent during this initial test to bring more sites up. Once we have determined that the revised design is working properly and the documentation is adequate for a reasonably adept Amateur to properly assemble, calibrate, interface and place the TNC into operation, the kits will be made available to all on a more-or-less first-come, first-served basis.

#### DISTRIBUTION, SCHEDULING and COST

The mechanism for distribution is simple. The orders will be handled based on the order in which they are received. TAPR members will have a degree of priority. Orders for multiple units will be spaced out somewhat so no one can order a huge block and tie up distribution.

How do you get on the list? Send your order to:

Tucson Amateur Packet Radio Corporation  
PO Box 22888  
Tucson AZ 85734-2888

and include your name, shipping address, etc., along with a deposit of \$25. Upon receipt of your deposit (including 16 days for clearing of non-cashier's checks), you will be placed in the queue. You will be advised by return mail of your expected shipping date. Balance of payment is due at least one week before scheduled ship date (or you may get bumped!).

TAPR will attempt to have a daytime telephone number where Visa/MasterCard orders can be placed (with an approximate 3% adder for such orders).

The price of the complete kit is \$240 plus \$7 shipping and handling. This is \$29 more than the Beta boards, and the increase is for the following reasons:

- 1) There is more memory on the board.
- 2) We are having the pc boards electrically tested.
- 3) There is a 30 days-after-shipment warranty on the parts (and we have to make this good, not the chip manufacturer).
- 4) We lost thousands of dollars on Beta.
- 5) We need money to launch our R & D effort for high-speed UHF linking systems.
- 6) We are having a commercial firm do the kitting for us to conserve our time for technical work.

Since many of the parts on the TNC are now on allocation, we have taken the steps to schedule a number of kits. However, we need IMMEDIATE feedback on your expected needs, as well as deposits, so we can better plan. Our present schedule calls for general kit deliveries starting in late August/early September. We are planning on 25 kits the first month, followed by 50 kits for each of the following three months. That is only 175 kits, so if you are interested, act promptly! If we get sufficient orders, we will modify the schedule to take care of things as expeditiously as possible.

#### PRODUCT SUPPORT

Please note that support of the TNC, including such things as service bulletins, modifications for improved performance, announcements of software and hardware updates, etc., will be done via the Packet Status Register, TAPR's official newsletter. Thus, it is suggested that purchasers of the TNC consider becoming members of TAPR.

	PACSAT STATUS	
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from den connors, kd2s

The most serious problem we have right now is the ability of our group in Canada to make 1/4 megabyte RAMDISKS, vs our need for about 1 megabyte units for the satellite. I will be discussing the matter with /larry, and will hopefully have a resolution (4 identical modules) by week's end, if Larry is willing to undertake four times the construction. If not, we'll have to try to assist down here with labor.

System needs dictate two types of target systems, one with a 9600/1200 uplink and similarly capable downlink for proof-of-concept tests of file transfer facilities per the VITA specs, the other for multiple-access gateway and individual user for messages and experimentation. Again, 1200 baud capability is required, and 9600 baud is desired for experimentation. Memory needs are dictated by VITA-type utilization, which at certain times might require most of 1 megabyte of memory.

The minimum system we should shoot for should therefore be 1 megabyte of storage in a communications subsystem with four uplinks and two downlinks. One uplink and one downlink will be pretty much dedicated to file transfer, especially over the areas where there is VITA activity, and operating at 9600 baud while over regional centers, and 1200 baud over remote sites (our solar-powered stations). At least two uplinks, and possibly up to four, will then be available for a second message channel.

Operation using speed-switchable channels offers the most economical means of accomplishing our goals. The DPSK modem design is coming along fairly well, and John DuBois, Phil Karn and myself should be getting together in less than two weeks for a review and analysis of the work Phil has done.

Processor simulations has shown a fatal flaw in our desire to stick to 18XX-series Processors. Either we need to incorporate the HDLC circuitry that the Japanese have built for their PACSAT system, or go to a low-threshold CMOS microprocessor which can handle 9600 baud communication rates.

Final sizing of the communications boxes awaits a further study of the use of JAMSAT design vs. Z-80 type Processors. I will discuss the matter with Harold Price as soon as possible.

Larry Keyser will require .1 watt of power per 1/4 megabyte of RAMUNIT modules. Peak can be 10 times that for very short periods of time. RAMUNIT will be the most flexible unit to package, and we'll have to look at the power system, control system and communication systems requirements before giving him his form factors. He needs typically 6" X 9" X 1" per 1/4 megabyte.

Completion of this phase of the definition has been hampered by terrible timing of four group leaders/ managers, who have all decided to move their abodes near-simultaneously. KD2S will not be moving until this weekend, which puts yet another crimp in the process to generate an intermediate design document on time (end of May). Expect a few more notes on status to be forwarded from the OnTyme message service and this medium before integration into a real document can be expected.

HF PACKETEERING

from tom clark, w3iwi

On the long-distance Packet work, WA2LQQ and W3IWI took the opportunity of the Memorial Day holiday to try again with ZL1AOX. This time we tried running at 600 Baud. W3IWI did connect, but had local QRM. WA2LQQ's bigger signal won out, and Rip & Ian went at it for an hour, with Ian even sending a file to Rip. In Washington, K1HTY/KA1GD were SWLing and copied Packets from Ian. Here is a bit of what went on:

```
cmd:hb
HBAUD    7
cmd:i

cmd:  $
EH?
cmd:c zlaox
cmd:frame read
00-RE826498 A2A260B4 9862829E B06140F0      WA2LQQ0ZL1AOX0$X ..d...`..b...: 10-69732074 68617420 6F6B0D      49. :40:.75. is that ok.
ZL1AOX>WA2LQQ:is that ok

frame read
00-RE826498 A2A260B4 9862829E B0616AF0      WA2LQQ0ZL1AOX05X ..d...`..b...: 10-6F6B2072 69700D      75. 948. ok rip.
ZL1AOX>WA2LQQ:ok rip

frame read
00-RE826498 A2A260B4 9862829E B06166F0      WA2LQQ0ZL1AOX03X ..d...`..b...: 10-72697020 69207769 6C6C2074 72792074      948. 4. ;466. :9<. : rip i will tr: 20-6F207365 6E642061 2066696C 6520746F      7. 9272. 0. 3462. :7 o send a file 30-20796F75 0D      .<7:. you.
ZL1AOX>WA2LQQ:rip i will try to send a file to you
```

Today we moved up to 28.300 to avoid the beacon band. I was also experimenting with slight modifications to the TAPR TNC. Temporarily installed a LED (with 130 ohm pull-up) replacing R18, to show the Carrier Detect activity -- Strongly advise this mod for all!! The audio level is VERY critical with weak signals. This LED should be on solid with signal present and only flash occasionally with no signal.

Also with the 600 Baud rate, I helped things out by increasing C10 by paralleling 0.22 uf to improve lock & CD in the presence of fading. Was also experimenting adding .0015 uf across C11 when the band folded up.

And now some hints and kinks on using the TAPR board in a noisy (e.g. HF FSK) environment:

(1) It is VERY easy to set too much audio into the the board. This will have the effect of forcing the 2211 demodulator's carrier detect to the state that the HDLC chip thinks a carrier is present all the time.

Cure: run less audio.

Diagnostic: Look at Pin 5 of the 2211 (U18) -- it's easiest to set at the 4.7k resistor. Set RX audio level so this line is pulsing low about 10% of the time. I'll bet you were low nearly all the time! It's also useful to look at the comparator input (2211 Pin 3 = R17/C10). Set RX audio so you are idling about 30-50% of the Vref voltage on 2211 Pin 10. Would STRONGLY suggest that you add a LED indicator on Pin 5 = !CD -- this is much more useful for setting audio level than the audio indicator LED's.

(2) Tuning: Tuning is not easy. Typical HF rigs are not well equalized, and I found tuning very critical. You can use a scope on 2211 Pin 8 to help in the tuning. Here I find that the 1200 Hz tone corresponds to about 5.5 volts and the 2200 Hz tone to about 2.5 volts. The no signal idle condition is near the 1200 Hz tone end. I tried to improve equalization by using IC720's PBT to center this voltage in the tuning range when listening to noise.

(3) Procedures:

Unlike FM links, you must be prepared for a lot of retries -- With the Beta 2\*1 software, I run RETRY 0.

Keep packets short (I'd suggest PACLEN no more than 64, perhaps 32).

To help in tuning, some extra noise at the start is nice -- try using TXD and RXD both 10.

Send extra ID's as a tuning & feedback aid to the other fellow -- I would send 2 or 3 id's in a row to indicate that conditions were picking up.

On a pre-arranged basis, you might try lower baud rates. 400 (HBAUD 10), 600 (HBAUD 7), and 800 (HBAUD 11) might be interesting.

Use the BEACON feature to keep the frequency busy. I was running BEACON EVERY 2 much of the weekend. Don't hesitate to try CONNECT -- it also keeps the channel occupied very nicely.

(4) It sure would be nice if we could work SSB and packets on the same freq -- would make tuning much easier! Dan was going to try to wrk on the FCC about some relaxed rules/interpretations, and he might work on this one!

(5) It will be very interesting to hear reports on how well people do with other modems. Based on my 400 Baud PSK experience, a lot of Ian's transmissions SHOULD have been copyable. I expect that those with Phase-3B PSK modems (W3IWI, W1HDX, ZL1AOX, K4DQ, ZS1FE) will be trying them through the summer, both using Phase-3B and using the ionosphere.

## 1983 SLAPR ROSTER CONTINUED

New members added since 5/9/83 NODZE 047 1283  
BERNARD GERWITZ  
2 BELLERIVE COURT  
ST CHARLES MO 63301  
314-946-7964

WOCLR	048 1283	KA9NWB	049 1283
JERRY GORRELL		GEORGE ROMPOT	
RT 2, BOX 245-G		900 ROANOKE DR	
BELTON MO 64012		SPRINGFIELD IL 62702	
816-331-2763		217-787-3448	

KBOZL	050 1283	WD9DBJ	051 1283
RICHARD RIDENOUR		DICK GULBRANDSEN	
9 LAKE PEMBROKE DR		21 W. 464 ARMY TRAIL	
FERGUSON MO 63135		ADDISON IL 60101	
314-521-2520		312-620-8077	

W9KXQ	052 1283	WD9IVD	053 1283
JOHN KING		DALLAS DALTON	
P. O. BOX 3		708 ST ANTHONY DR	
GREENVILLE IL	62246	GODFREY IL	62035
618-664-0219		618-466-7737	

WBOSWA	054 1283	WA9ZCK	055 1283
ROBERT HAUSAM		JAMES HONEY	
4A UNIVERSITY TERRACE		204 KOHLER AVE	
COLUMBIA MO 65201		ANNA IL 62906	
314-875-8488		618-833-2519	

## HAM RADIO MAGAZINE FOR JULY FEATURES PACKET

If you haven't seen it yet, get a copy of HAM RADIO MAGAZINE for July. The cover is just absolutely beautiful. Then turn to page 14 where Margaret and Dan Morrison begin a five-page first installment of what is promised to be at least of two segments on PACKET. Part 1 discusses the history, operation, hardware and software. The Morrisons promise that Part 2 will include a discussion of the TAPR TNC, interface requirements and possible pitfalls. Happy reading!

## FMCALL

### ST LOUIS PACKET RADIO CLUB

The St. Louis Packet Radio Club is comprised of individuals interested in digital communications, especially via radio waves. Its main purpose is to stimulate the development and use of digital radio communication systems and to provide a forum for the exchange of ideas about the same.

The officers for 1983 include:

President WB9FLW Pere Eaton  
Vice-president KOPFX Mel Whitten  
Secretary/treasurer KAOAYO Ed Dillon  
SLAPR PROTOCOL Editor W9OFZ Gus Kuether

SLAPR meets the last Monday of January, March, May, July, September, and November in the Grand Teton Room at Deaconess Hospital at US40 and Hampton Avenue. All are welcome to join the activities fun.

SLAPR PROTOCOL is the official news letter of the St Louis Area Packet Radio Club. It is published six times a year. It is available by subscription at \$10.00 a year, which is inseparable from SLAPR membership.

The purpose of SLAPR PROTOCOL is to disseminate information about the state of the art in Packet Radio related activities. All interested individuals are invited to participate in two ways. The reader is free to make the information contained in this newsletter known as widely as possible. It is only asked that credit be given to the author and to SLAPR PROTOCOL. In the second place, the reader is invited and encouraged to contribute material for the betterment of Packet Radio. Address correspondence to:

SLAPR PROTOCOL  
1309 Gloucester Dr.  
Edwardsville, IL 62025

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SSSSS	L	A	PPPP	RRRR
S	L	A A	P P	R R
SSSSS	L	AAAAA	PPPP	RRRR
S	L	A A	P	R R
SSSSS	LLLLL	A A	P	R R

### ST. LOUIS AREA PACKET RADIO CLUB

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Mail to: Ed Dillon, Secretary/Treasurer  
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\* FIRST ANNUAL \*  
\* PACNIC \*  
\* JULY 24 1983 \*  
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KA6M  
HANK MAGNUSKI  
311 STANFORD AVE  
MENLO PARK, CA 94025

NEXT SLAPR MEETING  
FIRST ANNUAL PACNIC  
3:00 PM ON JULY 24, 1983  
AT THE HOME OF WB9FLW  
35 NORSPUR  
EDWARDSVILLE, IL  
ACTUALLY LOCATED IN GLEN CARBON  
SEE MAP INSIDE